# Observations on the relationships of the genera *Circaeus* Yablok. and *Mycterus* Clairv. with a description of the presumed larva of *Mycterus*

## (Col. Heteromera)

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A new family *Circaeidae* was proposed by Yablokoff-Khnzorian (1960) to accomodate the genus *Circaeus,* described by him from Baltic Amber fossils in the collection of the Palaeontological Institute of the USSR Academy of Sciences. Yablokoff considered the relationships of his new genus (and family) to be somewhat problematic, but suggested for it a position more or less intermediate between *Colydiidae* and *Mycetophagidae.* From the characters indicated in the description and figures, it is evident that the author was correct in referring the genus to the Heteromera, though some taxonomically important features (e. g. the form of the trochanters, whether the middle coxal cavities are closed outwardly by the sterna, whether the mesepisterna meet in front of the sternum, shape of the apical palpal segments, etc.) are not recorded —perhaps because they could not be seen in the specimens. A number of features which are indicated for *Circaeus* show that it can hardly be nearly related to *Colydiidae* or *Mycetophagidae*— for example the front coxae are shown in the figure as conically projecting, and are described as contiguous, the elytra lack epipleura, the tarsi are unlike anything known in those families, and the two basal ventrites are connate with the suture between them obsolete. Yablokoff considered the tarsal formula to be 4-4-4, but from his figures it would appear to be either 5-5-4 or 4-4-3. The basal tarsomere is very long in the middle and hind tarsi; segment 2 of the hind tarsi is strongly bilobed and Yablokoff indicates a minute additional segment at the base of the claw-bearing one. The 3rd tarsal segment is also more or less lobed in the front and middle tarsi. It is exceedingly

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unusual in Coleoptera for a minute penultimate segment to be present in only one pair of tarsi; if it is present in the hind legs of *Circaeus* it will probably prove to be present in all 3 pairs, making the tarsal formula 5-5-4. Other notable described features of *Circaeus* are the sharp dorsal longitudinal keel of the pronotum, the apparently glabrous metallic surface, and the moniliform antennae of moderate length, distinctly thickened towards the apex but hardly describable as clubbed. The apical segment of the maxillary palpi is described as large and thick, but its precise form is not indicated. The insect is small (length 2.7 mm.), of long-rectangular form with the elytra slightly rounded at the sides, the prothorax nearly as wide as the elytra, transverse, with no trace of side edges, its front margin produced in the middle over the head, and its disk with indistinct impressions on either side of the median longitudinal keel. The eyes are moderately large and entire, the head is rather deflexed, slightly narrower than the prothorax, and has a short median occipital keel. The elytra show no trace of striae or rows of punctures.

When all these characteres are taken into account, it seems to me that the most likely relationships of *Circaeus* are to *Aderidae-Phytobaenini* and possibly to *Mycteridae*. Indeed, it is not easy to find any feature of *Circaeus* which would preclude it from actually belonging to the former group. No other *Aderidae* are known with a glabrous metallic surface, but I have seen a number of Baltic Amber fossils of Coleoptera in which the spurious appearance of a metallic surface is produced by an extremely thin air film covering the surface. Such a film might well mask the very fine dense recumbent pubescence which is usual in *Aderidae* (see Báguena 1948). Genera of *Phytobaenini* with which *Circaeus* might be compared are *Notoxeuglenes* Pic (Trinidad), *Ganascus* Casey (USA), and *Syzetonellus* Blackb. (Australia).

The classificatory position of the genus *Mycterus* Clairv. has been much disputed. Lacordaire (1859) made for it a special tribe of the *Oedemeridae,* while Mulsant (1859) defined a family *Mycteriens* to include *Mycterus* together with *Salpinginae.* LeConte (1862) also recognised a family *Mycteridae,* but his group comprised *Mycterus* and the *Lacconotini;* later (1883) he merged *Mycteridae* with the *Melandryidae,* a group with which several others have associated *Lacconotini.* Seidlitz (1920), the eminent German specialist on Heteromera, included *Pythini, Salpingini, Cononotini, Lacconotini* and *Mycterini* as "unterfamilien" of *Pythidae*. Crowson (1955) dismembered Seidlitz's *Pythidae* and re-established *Mycteridae* in the sense of LeConte (1862). An affinity between *Hemipeplus* and *Lacconotini* seems to have been first suggested by van Emden (1942); Crowson (1955) recognised this relationships, but maintained a separate family *Hemipeplidae*.

The discovery of probable larvae of *Mycterus* provides an occasion for reconsidering the characters and relationships of *Mycteridae,* using evidence from both larval and adult structure. In the larval stage, it would appear that *Mycteridae* can hardly be separated from *Hemipeplus,* and the family is here re-defined to include the latter genus; relationships of the re-defined *Mycteridae* to other Heteromera are briefly considered.

The presumed larvae of *Mycterus* were discovered my M. G. de Viedma, under bark of dead planted *Pinus,* at two localities in the Spanish province of Ciudad Real. Two larvae were found at Umbría de Ventillas in October 1963, another at Tolmo, Viso del Marqués on Nov. 24 1963, and two more at the latter locality on Nov. 25 1963. These larvae proved to agree in their essential characters with those of *Hemipeplus* as defined by Böving and Craighead (1931) and van Emden (1942), also with Bondar's (1940) brief description and figure of the larva of *Eurypus,* and with undetermined Lacconotine larvae from Chile and Central Africa studied by R. A. Crowson. The only known European representatives of *Mycterini, Lacconotini* or *Hemipeplidae* are the species of *Mycterus.* M. de Viedma collected adults of *M. curculionoides* F. on flowers of *Cistus* within 200 metres of the Umbría de Ventillas larval habitat, on May 30 1964. The largest of the larvae would be of appropriate size for a full-grown larva of this species. The identification of the larvae as *Mycterus curculionoides* would thus seem to be at least highly probable; it is difficult to imagine what they could be if they do not belong to the genus *Mycterus.*

## Redefinition of the Mycteridae.

1. ADULTS. With the general characters of Cucujoidea-Heteromera.

Tarsal formula 5-5-4 in both sexes. Antennae usually filiform or serrate, rarely slightly clubbed. Front coxae oblique, somewhat projecting, the prosternum long in frot of them, the sterno-pleural suture, at least in its posterior part, oblique and more or less in line with the long axis of the coxae; coxal cavities closed internally, sometimes visibly closed posteriorly; coxae nearly or quite contiguous, prosternal process more or less evanescent between them. Middle coxae rather narrowly separated, their cavities closed outwardly by meeting of meso- and metasterna; mesepisterna not nearly meeting in front of sternum. Hind coxae nearly contiguous, the met-endosternite characteristic (fig. 6), with anterior tendons arising from the body of the furca, not from the arms. Elytra never with striae or regular rows of punctures. Abdomen with 2-3 basal ventrites connate; aedeagus of inverted heteromeran type, the tegmen represented by a "basal piece" and pair of lateral lobes (parameres) often fused together, lying ventrally to the median lobe (penis).

2. LARVAE. With the general features of Cucujoidea-Heteromera.

Head with frontal sutures of Cucujoid shape, no distinct endocarina, median epicranial suture present, varying from very short to moderately long. Antennae with sensory appendage of segment 2 very short, dome-shaped. Number of ocelli variable. Mandibles 3-toothed at the apex, molar area asperate or not, somewhat produced at its anterior end. Maxillae with cardines oblique, divided or not, the articulating area rather small. Labium with mentum largely free from maxillary articulating skin, ligula broad and protuberant. Gular region occupied by a sclerite of characteristic shape (fig. 2), strongly narrowed in front. Hypostomal rods more or less distinct and divergent.

Legs very widely separated, the coxae almost lateral, the distance between them almost equal to the width of the head. Tarsungulus bisetose, coxae with setae but not spines. General body form flattened, more or less parallel-sided except for 9th abdominal segment, degree of sclerotisation of trunk segments variable in the group. Spiracles relatively large, rounded, with or without a series of small lateral air-tubes giving a crenulate appearance to part of their margins (cf. fig. 4). Abdominal segment 9 with its sternite (and segment 10) completely received in an emargination of sternite 8, the apparent last segment of the body being formed entirely of tergite 9, which is wider than the remaining segments, strongly sclerotised, and often inclined to the longitudinal axis of the body (cf. fig. 5).

### Description of the larva of *Mycterus (?curculionoides)*.

Head capsule evenly and not very strongly rounded at sides, frontal sutures (fig. 1) of characteristic shape, the basal part only slightly curved, the distal section faint or obsolete; 2 ocelli on each side, the larger one anterior. Antennae with segment 1 about as long as wide, segments 2 and 3 each about 2 1/2 times as long as wide, length of 3 about equal to width of 2. Mandibles with molar part not asperate, the cutting edge with a distinct tooth behind the 3 apical ones. Maxillae (fig. 3) with cardines very distinctly divided. Labial palpi with 2 very distinct segments, each about as long as wide, born on segment-like palpigers. Hypostomal rods distinct, parallel in front, curving and divergent posteriorly.

Trunk, except for the tergite of abdominal segment 9, rather pale and rather lightly sclerotised, nearly parallel-sided. Abdominal terga 2-6 with paired lines of very fine asperities, as figured (fig. 1). Tergite 9 more strongly sclerotised, characteristically shaped, and normally tilted at a considerable angle to the long axis of the body. Spiracles annular with the posterior border of the opening crenulate (fig. 4).

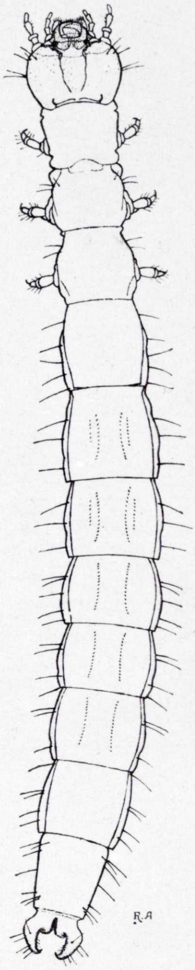
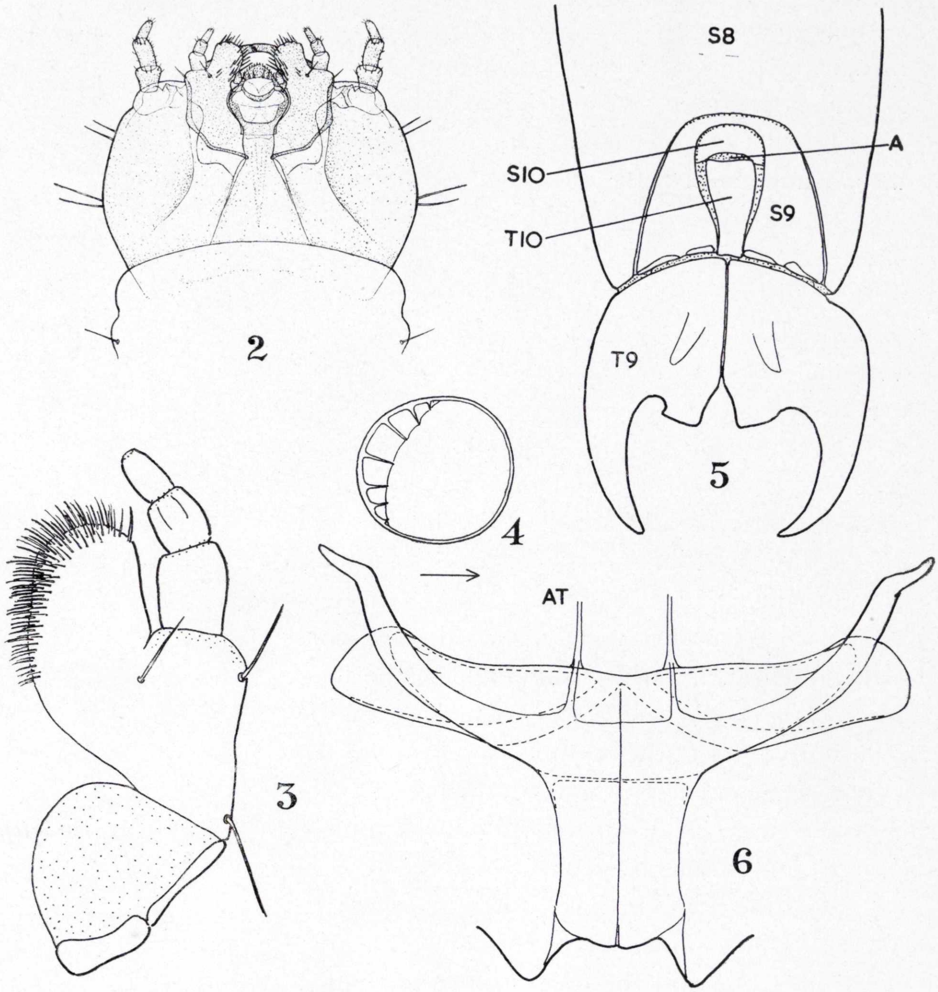


Fig. 1.—*Mycterus curculionoides* larva, dorsal view.

The gut-contents of a larva of which preparations were made proved to consist almost entirely of fibrous vegetable material — as was also the case in two other Lacconotine larvae of which similar preparations were made, one from Chile and the other from the Congo. The food and mode of feeding in all of these is probably very similar to that in *Pyrochroa* and other larvae feeding on the cambial region of dead trees. The sizes of the larvae collected in October and November varied considerably, which suggests that, as is known to be the case in *Pyrochroa*, development takes more than one year. No other species of Coleoptera were found in close association with the *Mycterus* larvae, though in one case larvae of *Criocephalus (Cerambycidae)* were found in the same tree. There was no indication of particular association with *Scolytidae* or *Pissodes*. The female of *Mycterus* has a relatively long and well-developed ovipositor.



Figs. 2-6.—*Mycterus curculionoides;* larva; 2) ventral view of head; 3) left maxilla, ventral view; 4) abdominal spiracle (arrow points anteriorly); 5) end of abdomen, ventral view, S8, S9, S10, sternites of segments 8, 9 and 10 of abdomen, T9, T10, tergites of segments 9 and 10; A, anus; 6) ditto, adult, metendosternite, dorsal view, AT, anterior tendon.

## Comparison of *Mycterus* larva with other known Mycterid types.

The form of the 9th abdominal tergite provides the most obvious distinguishing features in Mycterid larvae, as it does in *Pyrochroidae*. In *Mycterus* the 9th tergite is perhaps more similar to that of *Boros* than it is in other known Mycterid larvae, and this may indicate the retention of certain primitive features in the genus. In having only 2 ocelli on each side, *Mycterus* resembles an African Lacconotine larva *(?Eurypinus)* which I have studied but differs from *Hemipeplus,* which according to Böving and Craighead has 5 ocelli on each side. The African Lacconotine larva however differs from *Mycterus* in having a much longer epicranial suture, and in the different shape of the frontal sutures. The lines of asperities on the terga of abdominal segments 3-7 separate *Mycterus* from *Hemipeplus* and from the African Lacconotine larva mentioned; a Lacconotine larva from Chile however has rather similar but more strongly marked asperities on both terga and sterna of abdominal segments 2-5. The well-developed labial palpi of the *Mycterus* larva will distinguish it from those of the African and Chilean *Lacconotinae* studied by me, and apparently also from *Hemipeplus,* if Böving and Craighead's figure is to be trusted.

## The Relationships of Mycteridae to other Heteromera.

Among Heteromeran larvae known to me, the nearest approach to the peculiar structure of abdominal tergite 9 in *Mycteridae* is found in *Boros (Boridae);* Pyrochroid larvae approach the Mycterid condition rather less closely, as do those of *Inopeplidae, Pytho, Salpingidae, Elacatidae,* etc. In the adult stage, *Boros* differs from *Mycteridae* in having no lobing of the penultimate tarsal segment, in the middle coxal cavities not being closed outwardly by the sterna, in the front coxal cavities being open internally as well as externally, in the met-endosternite with the anterior tendons arising from the bases of the arms instead of from the body of the furca, and in the short clubbed antennae. Forms apparently closer to *Mycteridae* in adult characters than is *Boros* include the *Cononotidae* (Crowson 1955) and the problematic genus *Lagrioida.* The *Cononotidae* differ from *Mycteridae* mainly in having a simple penultimate tarsal segment and rather more projecting front coxae and a shorter prosternum in front of them; *Lagrioida* differs from *Mycteridae* in having the anterior tendons of the met-endosternite definitely on the arms, in a different form of the apodeme of the hind coxae, and in the middle coxal cavities being not nearly closed outwardly by the sterna. The larva of *Lagrioida,* which I have found in New Zealand, is very unlike those of *Mycteridae,* but suggests a possible affinity to the Anthicid group; Mulsant's figure of the larva of the Cononotid *Agnathus* (1866) leaves a great deal to the imagination. It is clear however that the *Agnathus* larva has the 9th abdominal tergite rather narrower than segment 8, as in *Pytho, Inopeplidae,* etc. A median longitudinal line is indicated in the basal part of this tergite; among known larvae, this appears to be present only in *Boros, Mycterus* and *Hemipeplus.* The figure and description suggest that the ventral aspect of the 9th segment in the *Agnathus* larva may also approach the condition in *Boros* and *Mycteridae.* Whether *Agnathus (Cononotidae)* or *Boros* is the closest relative of *Mycteridae* seems an open question at present.

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